APPENDIX D

PCAPCD EMISSION CALCULATIONS

PCAPCD EMISSION CALCULATIONS

FOR GE LM6000 OPTION

NOx only - Possible operating scenario - GE LM6000 Option

	1st	2nd	3rd	4th	
Base Load Only Hours	1,324	1,094	1,247	1,298	4,963
Peaking Hours (Duct Firing)	500	321	849	509	2,179
Total Base and Peak Hours	1,824	1,415	2,096	1,807	7,142
Total Startup Hours	50	83	26	52	211
Total Operating Hours	1,874	1,498	2,122	1,859	7,353
Offline Hours	286	686	86	350	1,408
Total Hours in Period	2,160	2,184	2,208	2,208	8,760
Capacity Factor					
Base Load	84%	65%	95%	82%	82%
Peaking	23%	15%	38%	23%	25%
Weighted (approx.)	68%	51%	80%	66%	66%
Number of Hours of Starts (each CTG)					
Hot	14.0	31.0	23.0	19.0	87.0
Warm	16.5	19.5	1.0	12.0	49.0
Cold	1.0	4.3	0.3	3.0	8.7
Total Number of Hours of Starts	31.5	54.8	24.3	34.0	144.7
Hours per Start					
Hot	1				
Warm	2				
Cold	3				

Turbine including startup/shutdown	Hours Quarter 1	Hours Quarter 2	Hours Quarter 3	Hours Quarter 4
TOTAL HOURS	1,943	1,589	2,127	1,916

Plant dispatch schedule.- CO, PM-10, SOX and VOCs - GE LM-6000 Option

	Quarter				Total
Element/Operation	**1st**	**2nd**	**3rd**	**4th**	**Annual**
Power Plant:					
Base load only hours	1,123	1,188	751	852	3,914
Peaking hours (duct firing)	929	559	1,347	1,246	4,081
Total base and peak hours	2,052	1,747	2,098	2,098	7,995
Total startup hours	44	127	34	47	252
Total operating hours	2,096	1,874	2,132	2,145	8,247
Offline hours	64	310	76	63	513
Total hours in period	2,160	2,184	2,208	2,208	8,760
Capacity factor:					
Base load	95%	80%	95%	95%	91%
Peaking	43%	26%	61%	56%	47%
Weighted (approximately)	81%	65%	86%	85%	79%
Hours of starts (each CTG):					
Hot	25	71	29	42	167
Warm	8	20	1	1	30
Cold	1	2	1	1	5
Total number of Hours of starts	34	98	31	44	207
Hours per start					
Hot	1				
Warm	2				
Cold	3				
Auxiliary boiler:					
Margin	30%				
Operating hours	140	568	143	143	995
Standby generator:					
Number of Tests	25	25	25	25	100
Fire pump:					
Number of Tests	25	25	25	25	100

PCAPCD Emission Calculations
GE LM6000 Turbines

BASE	lbs/hr per turbine	lbs/hr two turbines	Hours/turbine Quarter 1	Hours/turbine Quarter 2	Hours/turbine Quarter 3	Hours/turbine Quarter 4
NOx	3.408	6.816	1,324	1,094	1,247	1,298
CO	4.15	8.3	1,123	1,188	751	852
VOC	1.188	2.376	1,123	1,188	751	852
PM10	3.166	6.332	1,123	1,188	751	852
SO2	0.657	1.314	1,123	1,188	751	852

PEAK	lbs/hr per turbine	lbs/hr two turbines	Hours Quarter 1	Hours Quarter 2	Hours Quarter 3	Hours Quarter 4
NOx	4.994	9.988	500	321	849	509
CO	6.081	12.162	929	559	1,347	1,246
VOC	1.742	3.484	929	559	1,347	1,246
PM10	4.617	9.234	929	559	1,347	1,246
SO2	0.959	1.918	929	559	1,347	1,246

HOT START	lbs/hr per turbine	lbs/hr two turbines	Hot Start Hours Quarter 1	Hot Start Hours Quarter 2	Hot Start Hours Quarter 3	Hot Start Hours Quarter 4
NOx	8.8	15.9	14	31	23	19
CO	9.2	16.3	25	71	29	42
VOC	1.4	2.3	25	71	29	42
PM10	3.2	6.3	25	71	29	42
SO2	0.7	1.3	25	71	29	42

WARM START	lbs/hr per turbine	lbs/hr two turbines	Warm Start Hours Quarter 1	Warm Start Hours Quarter 2	Warm Start Hours Quarter 3	Warm Start Hours Quarter 4
NOx	12.2	29.2	33	39	2	24
CO	10.8	27.6	8	20	1	1
VOC	1.4	4.5	8	20	1	1
PM10	3.2	12.7	8	20	1	1
SO2	0.7	2.6	8	20	1	1

COLD START	lbs/hr per turbine	lbs/hr two turbines	Cold Start Hours Quarter 1	Cold Start Hours Quarter 2	Cold Start Hours Quarter 3	Cold Start Hours Quarter 4
NOx	19.3	49.7	3	13	1	9
CO	14.3	42.2	1	2	1	1
VOC	1.4	6.6	1	2	1	1
PM10	3.2	19	1	2	1	1
SO2	0.7	3.9	1	2	1	1

PCAPCD Emission Calculations

GE LM6000 Turbines

BASE	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	4,512	3,728	4,250	4,422
CO	4,660	4,930	3,117	3,536
VOC	1,334	1,411	892	1,012
PM_{10}	3,555	3,761	2,378	2,697
SO_2	738	781	493	560

PEAK	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	2,497	1,603	4,240	2,542
CO	5,649	3,399	8,191	7,577
VOC	1,618	974	2,346	2,171
PM_{10}	4,289	2,581	6,219	5,753
SO_2	891	536	1,292	1,195

HOT START	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	123	273	202	167
CO	230	653	267	386
VOC	35	99	41	59
PM_{10}	80	227	93	134
SO_2	18	50	20	29

WARM START	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	403	476	24	293
CO	86	216	11	11
VOC	11	28	1	1
PM_{10}	26	64	3	3
SO_2	6	14	1	1

COLD START	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	58	251	19	174
CO	14	29	14	14
VOC	1	3	1	1
PM_{10}	3	6	3	3
SO_2	1	1	1	1

PCAPCD Emission Calculations

GE LM6000 Turbines

BASE	Two Turbine Base Quarter 1 Lbs/quarter	Two Turbine Base Quarter 2 Lbs/quarter	Two Turbine Base Quarter 3 Lbs/quarter	Two Turbine Base Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	9,024	7,457	8,500	8,844	16.91
CO	9,321	9,860	6,233	7,072	16.24
VOC	2,668	2,823	1,784	2,024	4.65
PM_{10}	7,111	7,522	4,755	5,395	12.39
SO_2	1,476	1,561	987	1,120	2.57

PEAK	Two Turbine Peak Quarter 1 Lbs/quarter	Two Turbine Peak Quarter 2 Lbs/quarter	Two Turbine Peak Quarter 3 Lbs/quarter	Two Turbine Peak Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	4,994	3,206	8,480	5,084	10.88
CO	11,298	6,799	16,382	15,154	24.82
VOC	3,237	1,948	4,693	4,341	7.11
PM_{10}	8,578	5,162	12,438	11,506	18.84
SO_2	1,782	1,072	2,584	2,390	3.91

HOT START	Two Turbine Hot Start Quarter 1 Lbs/quarter	Two Turbine Hot Start Quarter 2 Lbs/quarter	Two Turbine Hot Start Quarter 3 Lbs/quarter	Two Turbine Hot Start Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	223	493	366	302	0.69
CO	408	1,157	473	685	1.36
VOC	58	163	67	97	0.19
PM_{10}	158	447	183	265	0.53
SO_2	33	92	38	55	0.11

WARM START	Two Turbine Warm Start Quarter 1 Lbs/quarter	Two Turbine Warm Start Quarter 2 Lbs/quarter	Two Turbine Warm Start Quarter 3 Lbs/quarter	Two Turbine Warm Start Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	964	1,139	58	701	1.43
CO	221	552	28	28	0.41
VOC	36	90	5	5	0.07
PM_{10}	102	254	13	13	0.19
SO_2	21	52	3	3	0.04

COLD START	Two Turbine Cold Start Quarter 1 Lbs/quarter	Two Turbine Cold start Quarter 2 Lbs/quarter	Two Turbine Cold Start Quarter 3 Lbs/quarter	Two Turbine Cold Start Quarter 4 Lbs/quarter	
NO_x	149	646	50	447	0.65
CO	42	84	42	42	0.11
VOC	7	13	7	7	0.02
PM_{10}	19	38	19	19	0.05
SO_2	4	8	4	4	0.01

STARTUP SUBTOTAL	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	1,335	2,278	474	1,450	2.77
CO	671	1,794	543	754	1.88
VOC	100	267	78	108	0.28
PM_{10}	278	739	214	296	0.76
SO_2	57	152	44	61	0.16

TURBINE TOTAL	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	15,354	12,941	17,453	15,378	30.56
CO	21,290	18,453	23,158	22,980	42.94
VOC	6,005	5,037	6,555	6,473	12.03
PM_{10}	15,967	13,424	17,408	17,197	32.00
SO_2	3,315	2,785	3,615	3,570	6.64

GE CTG and HRSG	lbs/hr	lbs/day		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx				15,354	12,941	17,453	15,378	30.56
CO				21,290	18,453	23,158	22,980	42.94
VOC				6,005	5,037	6,555	6,473	12.03
PM10				15,967	13,424	17,408	17,197	32.00
SO2				3,315	2,785	3,615	3,570	6.64

BOILER	lbs/hr	lbs/day		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx	0.68	16.3		95	386	97	97	0.34
CO	2.29	55.0		321	1301	327	327	1.14
VOC	0.31	7.5		44	177	44	44	0.15
PM10	0.58	13.9		81	329	83	83	0.29
SO2	0.08	1.9		11	45	11	11	0.04

Cooling Tower	lbs/hr	lbs/day		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx	-	-	-					
CO	-	-	-					
VOC	-	-	-					
PM10	0.681	16.35		1,471	1,487	1,504	1,504	2.98
SO2	-	-	-					

TOTAL EMISSIONS - Boiler, GE Turbines, Cooling Tower				Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx				15,449	13,327	17,550	15,475	30.90
CO				21,610	19,753	23,485	23,307	44.08
VOC				6,049	5,213	6,600	6,518	12.19
PM10				17,520	15,240	18,995	18,783	35.27
SO2				3,326	2,831	3,626	3,582	6.68

Emergency Generator (Caterpillar ,			1133 hp					
	g/hp-hr	lbs/hr	lbs/day (1/2 hour max)	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx	6.9	4.31	4.31	54	54	54	54	0.108
CO	1.34	0.84	0.84	10	10	10	10	0.021
VOC	0.25	0.16	0.16	2	2	2	2	0.004
PM10	0.22	0.14	0.14	2	2	2	2	0.003
SO2	-	0.10	0.10	1	1	1	1	0.002
Assuming 30 minutes per week testing (12.5 hours/quarter) and total of 50 hrs per year max at 50% load.								
Daily maximum calculated based on 30 minutes testing. Quarterly emissions calculated based on 12.5 hours per quarter.								

Fire Pump			300.0 hp					
	g/hp-hr	lbs/hr	lbs/day (1/2 hour max)	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx	5.2	1.72	1.72	43	43	43	43	0.086
CO	0.27	0.09	0.09	2	2	2	2	0.004
VOC	0.15	0.05	0.05	1	1	1	1	0.002
PM10	0.09	0.03	0.03	1	1	1	1	0.001
SO2	0.099	0.19	0.19	5	5	5	5	0.010
Assuming 30 minutes per week testing (12.5 hours/quarter) and total of 50 hrs per year max at 100% load.								
Daily maximum calculated based on 30 minutes testing. Quarterly emissions calculated based on 12.5 hours per quarter.								

Total Facility - GE LM6000 Turbines								
				Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx				15,546	13,424	17,647	15,572	31.09
CO				21,623	19,766	23,498	23,320	44.10
VOC				6,052	5,217	6,603	6,521	12.20
PM10				17,522	15,243	18,997	18,786	35.27
SO2				3,332	2,837	3,632	3,588	6.69

PCAPCD EMISSION CALCULATIONS
FOR ALSTOM GX-100 OPTION

NOx only - Possible operating scenario - Alstom GX100 Option

	1st	2nd	3rd	4th	
Base Load Only Hours	1,124.9	833.2	1,179.4	1,102.7	4,240.2
Peaking Hours (Duct Firing)	424.8	244.5	803.0	432.6	1,904.9
Total Base and Peak Hours	1,549.7	1,077.7	1,982.4	1,535.3	6,145.1
Total Startup Hours	42.5	63.2	24.6	44.2	174.5
Total Operating Hours	1,592.2	1,140.9	2,007.0	1,579.5	6,319.6
Offline Hours	567.8	1,043.1	201.0	628.5	2,440.4
Total Hours in Period	2,160.0	2,184.0	2,208.0	2,208.0	8,760.0
Capacity Factor					
Base Load	0.7	0.5	0.9	0.7	0.7
Peaking	0.2	0.1	0.4	0.2	0.2
Weighted (approx.)	0.6	0.4	0.8	0.6	0.6
Number of Hours of Starts (each CTG)					
Hot	11.9	23.6	21.8	16.1	73.4
Warm	14.0	14.9	0.9	10.2	40.0
Cold	0.8	3.3	0.3	2.5	7.0
Total Number of Hours of Starts	26.8	41.8	23.0	28.9	120.4
Hours per Start					
Hot	1.0				
Warm	2.0				
Cold	3.0				

	Hours Quarter 1	Hours Quarter 2	Hours Quarter 3	Hours Quarter 4
Turbine including startup/shutdown	1	2	3	4
TOTAL HOURS	1,651	1,210	2,012	1,628

Plant dispatch schedule.- CO, PM-10, SOX and VOCs - Alstom GX-100 Option					
	Quarter				Total
Element/Operation	**1st**	**2nd**	**3rd**	**4th**	**Annual**
Power Plant:					
Base load only hours	1,123	1,188	751	852	3,914
Peaking hours (duct firing)	929	559	1,347	1,246	4,081
Total base and peak hours	2,052	1,747	2,098	2,098	7,995
Total startup hours	44	127	34	47	252
Total operating hours	2,096	1,874	2,132	2,145	8,247
Offline hours	64	310	76	63	513
Total hours in period	2,160	2,184	2,208	2,208	8,760
Capacity factor:					
Base load	95%	80%	95%	95%	91%
Peaking	43%	26%	61%	56%	47%
Weighted (approximately)	81%	65%	86%	85%	79%
Hours of starts (each CTG):					
Hot	25	71	29	42	167
Warm	8	20	1	1	30
Cold	1	2	1	1	5
Total number of Hours of starts	34	98	31	44	207
Hours per start					
Hot	1				
Warm	2				
Cold	3				
Auxiliary boiler:					
Margin	30%				
Operating hours	140	568	143	143	995
Standby generator:					
Number of Tests	25	25	25	25	100
Fire pump:					
Number of Tests	25	25	25	25	100

PCAPCD Emission Calculations
Alstom GX100 Turbines

BASE	**lbs/hr per turbine**	**lbs/hr two turbines**	**Hours/turbine Quarter 1**	**Hours/turbine Quarter 2**	**Hours/turbine Quarter 3**	**Hours/turbine Quarter 4**
NO_x	3.469	6.938	1,125	833	1,179	1,103
CO	4.224	8.448	1123	1188	751	852
VOC	0.363	0.730	1123	1188	751	852
PM_{10}	3.222	6.444	1123	1188	751	852
SO_2	0.669	1.338	1123	1188	751	852

PEAK	lbs/hr per turbine	lbs/hr two turbines	**Hours Quarter 1**	**Hours Quarter 2**	**Hours Quarter 3**	**Hours Quarter 4**
NO_x	5.133	10.266	424.8	244.4736	802.9842	432.5991
CO	6.226	12.452	929	559	1347	1246
VOC	1.783	3.566	929	559	1347	1246
PM_{10}	4.726	9.452	929	559	1347	1246
SO_2	0.981	1.962	929	559	1347	1246

HOT START	Pounds Per Start - one turbine	Pounds Per Start - two turbines	**Hot Start Hours Quarter 1**	**Hot Start Hours Quarter 2**	**Hot Start Hours Quarter 3**	**Hot Start Hours Quarter 4**
NO_x	22.6	34.1	12	24	22	16
CO	83.5	160.8	25	71	29	42
VOC	19.6	38.8	25	71	29	42
PM_{10}	3.2	6.4	25	71	29	42
SO_2	0.7	1.3	25	71	29	42

WARM START	Pounds Per Start - one turbine	Pounds Per Start - two turbines	**Warm Start Hours Quarter 1**	**Warm Start Hours Quarter 2**	**Warm Start Hours Quarter 3**	**Warm Start Hours Quarter 4**
NO_x	37.1	88.1	28	30	2	20
CO	89.5	188.1	8	20	1	1
VOC	19.7	76.7	8	20	1	1
PM_{10}	3.2	12.9	8	20	1	1
SO_2	0.7	2.7	8	20	1	1

COLD START	Pounds Per Start - one turbine	Pounds Per Start - two turbines	**Cold Start Hours Quarter 1**	**Cold Start Hours Quarter 2**	**Cold Start Hours Quarter 3**	**Cold Start Hours Quarter 4**
NO_x	37.1	122.8	3	10	1	8
CO	89.5	204.8	1	2	1	1
VOC	19.7	78.6	1	2	1	1
PM_{10}	3.2	19.3	1	2	1	1
SO_2	0.7	4	1	2	1	1

PCAPCD Emission Calculations

Alstom GX100 Turbines

BASE	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	3,902	2,890	4,091	3,825
CO	4,744	5,018	3,172	3,599
VOC	408	431	273	309
PM_{10}	3,618	3,828	2,420	2,745
SO_2	751	795	502	570

PEAK	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	2,180	1,255	4,122	2,221
CO	5,784	3,480	8,386	7,758
VOC	1,656	997	2,402	2,222
PM_{10}	4,390	2,642	6,366	5,889
SO_2	911	548	1,321	1,222

HOT START	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	269	534	492	365
CO	2,088	5,929	2,422	3,507
VOC	490	1,392	568	823
PM_{10}	80	227	93	134
SO_2	18	50	20	29

WARM START	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	1,040	1,102	70	757
CO	716	1,790	90	90
VOC	158	394	20	20
PM_{10}	26	64	3	3
SO_2	6	14	1	1

COLD START	Lbs/quarter per turbine Quarter 1	Lbs/quarter per turbine Quarter 2	Lbs/quarter per turbine Quarter 3	Lbs/quarter per turbine Quarter 4
NO_x	95	367	35	284
CO	90	179	90	90
VOC	20	39	20	20
PM_{10}	3	6	3	3
SO_2	1	1	1	1

PCAPCD Emission Calculations

Alstom GX100 Turbines

BASE	Two Turbine Base Quarter 1 Lbs/quarter	Two Turbine Base Quarter 2 Lbs/quarter	Two Turbine Base Quarter 3 Lbs/quarter	Two Turbine Base Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	7,804	5,781	8,183	7,651	14.71
CO	9,487	10,036	6,344	7,198	16.53
VOC	815	862	545	619	1.42
PM_{10}	7,237	7,655	4,839	5,490	12.61
SO_2	1,503	1,590	1,005	1,140	2.62

PEAK	Two Turbine Peak Quarter 1 Lbs/quarter	Two Turbine Peak Quarter 2 Lbs/quarter	Two Turbine Peak Quarter 3 Lbs/quarter	Two Turbine Peak Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	4,361	2,510	8,243	4,441	9.78
CO	11,568	6,961	16,773	15,515	25.41
VOC	3,313	1,993	4,803	4,443	7.28
PM_{10}	8,781	5,284	12,732	11,777	19.29
SO_2	1,823	1,097	2,643	2,445	4.00

HOT START	Two Turbine Hot Start Quarter 1 Lbs/quarter	Two Turbine Hot Start Quarter 2 Lbs/quarter	Two Turbine Hot Start Quarter 3 Lbs/quarter	Two Turbine Hot Start Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	406	805	742	551	1.25
CO	4,020	11,417	4,663	6,754	13.43
VOC	970	2,755	1,125	1,630	3.24
PM_{10}	160	454	186	269	0.53
SO_2	33	92	38	55	0.11

WARM START	Two Turbine Warm Start Quarter 1 Lbs/quarter	Two Turbine Warm Start Quarter 2 Lbs/quarter	Two Turbine Warm Start Quarter 3 Lbs/quarter	Two Turbine Warm Start Quarter 4 Lbs/quarter	Annual (Tpy)
NO_x	2,470	2,617	167	1,797	3.53
CO	1,505	3,762	188	188	2.82
VOC	614	1,534	77	77	1.15
PM_{10}	103	258	13	13	0.19
SO_2	22	54	3	3	0.04

COLD START	Two Turbine Cold Start Quarter 1 Lbs/quarter	Two Turbine Cold start Quarter 2 Lbs/quarter	Two Turbine Cold Start Quarter 3 Lbs/quarter	Two Turbine Cold Start Quarter 4 Lbs/quarter	
NO_x	313	1,216	116	939	1.29
CO	205	410	205	205	0.51
VOC	79	157	79	79	0.20
PM_{10}	19	39	19	19	0.05
SO_2	4	8	4	4	0.01

STARTUP SUBTOTAL	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	3,189	4,638	1,025	3,287	6.07
CO	5,730	15,588	5,056	7,147	16.76
VOC	1,662	4,446	1,281	1,785	4.59
PM_{10}	283	751	218	301	0.78
SO_2	58	154	44	61	0.16

TURBINE TOTAL	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	15,354	12,928	17,451	15,379	30.56
CO	26,785	32,585	28,173	29,859	58.70
VOC	5,790	7,302	6,629	6,847	13.28
PM_{10}	16,300	13,690	17,789	17,568	32.67
SO_2	3,383	2,841	3,692	3,646	6.78

PCAPCD Emission Calculations

Alstom CTG and HRSG	lbs/hr	lbs/day		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x				15,354	12,928	17,451	15,379	30.56
CO				26,785	32,585	28,173	29,859	58.70
VOC				5,790	7,302	6,629	6,847	13.28
PM_{10}				16,300	13,690	17,789	17,568	32.67
SO_2				3,383	2,841	3,692	3,646	6.78

BOILER	lbs/hr	lbs/day		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	0.68	16.3		95	386	97	97	0.34
CO	2.29	55.0		321	1301	327	327	1.14
VOC	0.31	7.5		44	177	44	44	0.15
PM_{10}	0.58	13.9		81	329	83	83	0.29
SO_2	0.08	1.9		11	45	11	11	0.04

Cooling Tower	lbs/hr	lbs/day		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	-	-	-					
CO	-	-	-					
VOC	-	-	-					
PM_{10}	0.681	16.35		1,471	1,487	1,504	1,504	2.98
SO_2	-	-	-					

TOTAL EMISSIONS - Boiler, GE Turbines, Cooling Tower				Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NOx				15,449	13,314	17,548	15,476	30.89
CO				27,105	33,886	28,501	30,187	59.84
VOC				5,834	7,478	6,674	6,891	13.44
PM_{10}				17,852	15,507	19,376	19,155	35.95
SO_2				3,395	2,886	3,703	3,657	6.82

Emergency Generator (Caterpillar ,			1133					
	g/hp-hr	lbs/hr for 1/2 hr	lbs/day (1/2 hour max)	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	6.9	4.31	4.31	54	54	54	54	0.108
CO	1.34	1.67	1.67	10	10	10	10	0.021
VOC	0.25	0.31	0.31	2	2	2	2	0.004
PM_{10}	0.22	0.27	0.27	2	2	2	2	0.003
SO_2	-	0.10	0.10	1	1	1	1	0.001
Assuming 30 minutes per week testing (12.5 hours/quarter) and total of 50 hrs per year max at 50% load.								

Fire Pump			300.0					
	g/hp-hr	lbs/hr	lbs/day (1/2 hour max)	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x	5.2	3.44	1.72	43	43	43	43	0.086
CO	0.27	0.18	0.09	1	1	1	1	0.002
VOC	0.15	0.10	0.05	1	1	1	1	0.001
PM_{10}	0.09	0.06	0.03	0	0	0	0	0.001
SO_2	0.099	0.38	0.19	2	2	2	2	0.005
Assuming 30 minutes per week testing (12.5 hours/quarter) and total of 50 hrs per year max at 100% load.								
Daily maximum calculated based on 30 minutes testing. Quarterly emissions calculated based on 12.5 hours per quarter.								

Total Facility - Alstom GX100 Turbines								
				Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual (Tpy)
NO_x				15,546	13,411	17,645	15,573	31.09
CO				27,117	33,898	28,512	30,198	59.86
VOC				5,836	7,481	6,676	6,894	13.44
PM_{10}				17,854	15,509	19,378	19,157	35.95
SO_2				3,398	2,889	3,706	3,660	6.83

PCAPCD CALCULATIONS

FOR BOILER

PCAPCD Boiler Emission Calculations

Fuel

	Density (lbs/scf)	Btu/lb	Btu/scf
Natural Gas	0.045	22,794	1,026

Boiler Rating

58 MMBtu/hr
56,530 scf per hour

NOx Calculations (Enter number in cell with blue text)

ppm =	9.24 measured
acfm=	16709.6
Mosture Content	16.66%
dscfm=dry standard cubic feet per minute=	10,063

SV = specific molar volume = 379.5 @ 60 degrees F
Qsd = flowrate dscfm
MW = NOx = 46

NOx lbs/hr = ppm x 10^-06[MW]/SV x Qsd x 60 lbs/day
Max 0.68

CO Calculations (Enter number in cell with blue text)

ppm @3%O2 =	50
ppm =	51.31 measured
acfm=	16709.6
Mosture Content	16.66%
dscfm=dry standard cubic feet per minute=	10,063

SV = specific molar volume = 379.5 @ 60 degrees F
Qsd = flowrate dscfm
MW = CO = 28

CO lbs/hr = ppm x 10^-06[MW]/SV x Qsd x 60 lbs/day
Max 2.29

VOC Calculations

Emission Factor (lbs/MMscf)	MMscf/hr	lbs/hr
5.5	0.056530214	0.311

PM-10 Calculations

District Calculations using AP-42	Emission Factor (lbs/MMscf)*	MMscf/hr	lbs/hr
	7.6	0.0565302	0.430

* AP-42 (7/98) Table 1.4-2 Emission Factors for Criteria Pollutants and Greenhouse gases from natural gas combustion

Applicant indicates the boiler PM-10 emissions will be 0.01 lbs/MMBtu. At 58 MMBtu/hr, PM-10 emission are calculated by multiplying 58 x 0.01. This equals 0.58 lbs/hr of PM-10.

SOx-10 Calculations

Emission Factor (lbs/MMscf)	
0.6	for gas with 20 grains per 100 cf*
1.5	for natural gas with 50 grains/100 cf

* AP-42 (7/98) Table 1.4-2 Emission Factors for Criteria Pollutants and Greenhouse gases from natural gas combustion; assumes 100% of fuel sulfur is converted to SO2

Emission Factor (lbs/MMscf)	MMscf/hr	lbs/hr
1.5	0.0565	0.08

	Max/day	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Hours/year
Operating hours	24	140	568	143	143	995

Boiler

	lbs/hr	lbs/day max		Quarter 1 lbs	Quarter 2 lbs	Quarter 3 lbs	Quarter 4 lbs	Annual (Tpy)
NOx	0.68	16.3		95	386	97	97	0.34
CO	2.29	55.0		321	1,301	327	327	1.14
VOC	0.31	7.5		44	177	44	44	0.15
PM10	0.58	13.9		81	329	83	83	0.29
SO2	0.08	1.9		11	45	11	11	0.04

Fuel

	Density (lbs/scf)	Btu/lb	Btu/scf
Natural Gas	0.045	22,794	1,026

Boiler Rating

58 MMBtu/hr

56,530 scf per hour

APPENDIX E

ERC SUMMARY TABLES

NOx ERC's for Roseville Energy Park

Before Ratios:	(pounds)											
Certificate	Q1	Q2	Q3	Q4	Total, ppy	Total, tpy	Type	Location				
2001-23	5050	5050	5050	5050	20,200	10.10	NOx	Placer				
2001-26	33512	33512	33512	33512	134,048	67.02	VOC	Placer				
EC-209	0	6888	0	3542	10,430	5.22	NOx	Yolo-Solano				
EC-210	0	10620	0	4414	15,034	7.52	NOx	Yolo-Solano				
Energy 2001, Inc./SMAQMD Bank	5300	5300	5250	4150	20,000	10.00	NOx	Placer				
After Ratios and Y-S Hold-Back: (Certificates for surrender prior to construction)									NOx Ratio	VOC Ratio	Total Ratio	Y-S Hold-Back
2001-23	2525	2525	2525	2525	10100	5.05			2.0	1.0	2.0	
2001-26	6445	6445	6445	6445	25778	12.89			2.0	2.6	5.2	
EC-209	0	2952	0	1518	4470	2.24			2.1	1.0	2.1	0.1
EC-210	0	4551	0	1892	6443	3.22			2.1	1.0	2.1	0.1
Subtotals	8970	16473	8970	12379	46792	23.396						
Target by Quarter	11,337	7,429	15,647	12,379	46,792	23.396						
From Q1	8970				8970	100.00%	Pct. Of available quarter credits					
From Q2	2367	7429	6677		16473	100.00%						
From Q3			8970		8970	100.00%						
From Q4				12379	12379	100.00%						
Quarter Totals	11,337	7,429	15,647	12,379	46,792							
Pct of needed	100.00%	100.00%	100.00%	100.00%								
After Ratios and Y-S Hold-Back: (Including anticipated certificates))												
2001-23	2525	2525	2525	2525	10100	5.05						
2001-26	6445	6445	6445	6445	25778	12.89						
EC-209	0	2952	0	1518	4470	2.24						
EC-210	0	4551	0	1892	6443	3.22						
Energy 2001, Inc./SMAQMD Bank	4077	4077	4038	3192	15385	7.69			1.3	1.0	1.3	
Subtotals	13047	20550	13008	15572	62,176	31.09						
Target by Quarter	15,546	13,412	17,646	15,572	62,176	31.09						
From Q1	13,047				13047	100.00%	Pct. Of available quarter credits					
From Q2	2500	13412	4638		20550	100.00%						
From Q3			13008		13008	100.00%						
From Q4				15,572	15572	100.00%						
Quarter Totals	15,547	13,412	17,646	15,572	62,176	62,176						
Pct of needed	100.00%	100.00%	100.00%	100.00%								

PM10 for Roseville Energy Park

ALSTOM TURBINE OPTION

Before Ratios: (pounds/quarter)

Certificate	Q1	Q2	Q3	Q4	Total, ppy	Total, tpy	Excess	
2001-22	2,578	20,167	16,085	15,916	54,746	27.37		
2001-24	22,680	-	13,440	22,680	58,800	29.40		
2001-24 (Reissued as 2004-06)	362	-	420	-	782	0.39		
Totals	25,620	20,167	29,945	38,596	114,328	56.77		
After Ratios--Certificates for surrender prior to construction								
2001-22	1,983	15,513	12,373	12,243	42,112	21.06		
2001-24	11,340	-	6,720	11,340	29,400	14.70		
2001-24 (Reissued 2004-06)	181	-	210		391	0.20		
Totals	13,504	15,513	19,303	23,583	71,903	35.95		
Target by Quarter	17,854	15,513	19,378	19,158	71,903	35.95	Excess	**(Based on GTX100--worst case)**
From Q1	13,504				13,504	100.00%	-	
From Q2		15,513			15,513	100.00%	0.1	
From Q3			19,303		19,303	100.00%	-	0.1
From Q4	4350		75	19,158	23,583	100.00%	0	
Totals	17,854	15,513	19,378	19,158	71,903			
	100.00%	100.00%	100.00%	100.00%			0	

Excess to be returned - Alstom Option

Location		Q1	Q2	Q3	Q4
Lincoln, Placer County	2001-22	0	2,096	0	0
Forresthill, Placer County					
Forresthill, Placer County					

PM10 Ratio
1.3
2.0

PM10 for Roseville Energy Park

GE TURBINE OPTION

Before Ratios: (pounds)

Certificate	Q1	Q2	Q3	Q4	Total, ppy	Total, tpy	Excess	
2001-22	2,578	19,820	16,085	15,916	54,399	27.20		
2001-24	22,680	-	13,252	21,490	57,422	28.71		
Totals	25,258	19,820	29,337	37,406	111,821	55.91		
After Ratios--Certificates for surrender prior to construction								
2001-22	1,983	15,246	12,373	12,243	41,845	20.92		
2001-24	11,340	-	6,626	10,745	28,711	14.36		
Totals	13,323	15,246	18,999	22,988	70,556	35.28		
Target by Quarter	17,523	15,246	18,999	18,788	70,556	35.28	Excess	**(Based on LM6000)**
From Q1	13,323				13,323	100.00%	0	
From Q2		15,246			15,246	100.00%	0	
From Q3			18999		18,999	100.00%	0	
From Q4	4,200			18,788	22,988	100.00%	0	
Totals	17,523	15,246	18,999	18,788	70,556			
	100.00%	100.00%	100.00%	100.00%			0	

Excess to be returned - GE Option

Location		Q1	Q2	Q3	Q4
Lincoln, Placer County	2001-22	0	2,443	0	0
Forresthill, Placer County	2001-24	0	0	188	1190

PM10 Ratio
1.3
2.0

APPENDIX F

LETTER FROM APPLICANT ON INTERPOLLUTANT TRADING RATIO

May 6, 2004

John Finnell
Sr. Air Pollution Control Engineer
Placer County APCD
11464 B Avenue
DeWitt Center
Auburn, Ca. 95603

Subject: Roseville Energy Park VOC or NO_x Interpollutant Trading Ratio

Dear Mr. Finnell;

Roseville Electric (RE) is proposing to use VOC emission reduction credits to offset a portion of their NO_x emissions from the proposed Roseville Energy Park (REP). They are proposing a 2.6:1 interpollutant offset ratio that, when applied to the Placer County APCD distance ratio of 2.0, results in a final ratio of 5.2:1. The proposed use of the 2.6:1 offset ratio is based upon review of the SMUD Cosumnes Power Project (CPP) interpollutant trade analysis, dated October 21, 2002. CPP performed a wide variety of analyses, including the use of the UAM model, to determine a VOC/NO_x offset ratio. These results of the UAM modeling are summarized in the October 21, 2002 Final Determination of Compliance. These studies indicate that a large degree of uncertainty exists with each method used to calculate interpollutant offset ratios. The UAM results provide a range of offset ratios between 0.6 and 7.9 with an average VOC/NO_x ratio of 2.0:1. To account for model uncertainty, an additional factor of 30% was applied to the average VOC/NO_x ratio to produce a final ratio of 2.6:1. REP proposes to use the same conservative 2.6:1 VOC/NO_x ratio rather than performing new UAM analyses that would ultimately produce a similar range of uncertainties. Furthermore, it is RE's position that the regional climate of the greater Sacramento area controls the generation of ozone.

Ozone formation depends on many factors but in the Sacramento area, the two most important factors are mobile emissions and weather conditions. Although changes in regional daily emissions of ozone precursors (such as automobile emissions) can affect daily ozone concentrations, weather variations best explain the day-to-day changes in ozone concentrations in this region. Understanding how weather influences ozone concentrations is critical in accurately predicting high ozone concentrations.

RE's proposal to use the CPP UAM study in order to apply the 2.6:1 interpollutant offset ratio is based on the fact that similar meteorological patterns exist between the REP and CPP sites that produce high ozone days. The proposed REP and CPP project sites are both situated in a transition zone between the Sierra Nevada Mountains and the Central Valley of California, within the Sacramento Valley. In this area, broad alluvial fans extend from the Sierra Nevada Mountains in the east toward sedimentary deposits in the Sacramento Valley to the west. A regional location map is shown in the attached figure that also includes the location of the CPP project in relation to REP.

The terrain in the vicinity of REP and CPP is characterized as generally flat with rolling foothills and the Sierra Nevada Mountains to the east, and the Sacramento Valley extending to the north, west and south. The terrain elevation on the REP plant site is approximately 95 feet above mean sea level (amsl). The proposed REP project is located in Placer County, in the southern part of the Sacramento Valley Air Basin while the CPP project site is located in South Sacramento County at an elevation of 160 feet (amsl). The overall terrain in the vicinity of both projects slopes gently downward in a westward direction toward the Sacramento Valley. At present, the area surrounding the site is generally undeveloped with some agricultural land uses.

The overall climate of California and including the REP and CPP project areas is “Mediterranean,” with overall moderate annual temperatures and precipitation occurring primarily during the winter months. The meteorology is dominated by a semi-permanent high-pressure system over the eastern Pacific Ocean off the coast of California. The center of the high-pressure system varies northward and southward. Its position strongly influences the weather in the region.

Given the large spatial variation of the primary emissions within the greater Sacramento area, it is the local regional climate that fosters generation of ozone. Meteorology is the dominant factor controlling the change in ozone air quality from one day to the next. Synoptic and mesoscale meteorological features govern the transport of emissions between sources and receptors, affecting the dilution and dispersion of pollutants during transport and the time available during which pollutants can react with one another to form ozone. These features are important to transport studies and modeling efforts owing to their influence on reactive components and ozone formation and deposition.

The summer climatology of central California is generally dominated by the semipermanent Eastern Pacific High-Pressure System. This synoptic feature is manifest as a dome of warm air (a maximum in the 500-mb geopotential height field) with a surrounding anticyclonic circulation (clockwise in the Northern Hemisphere). Therefore, surface winds blow clockwise and outward from the high, a motion associated with low-level divergence, and therefore sinking motion aloft and fair weather. This sinking motion also gives rise to adiabatic heating and therefore warm temperatures aloft. A key indicator of this warm, capping subsidence inversion in California is the temperature of the 850-mb pressure surface from the Oakland soundings. This single meteorological variable from the 0400 PST sounding is perhaps best correlated with surface ozone concentrations in the central valley (e.g., Smith et al. 1984; Smith 1994; Fairley and De Mandel 1996, Ship and McIntosh 1999). The shape of the 500-mb height contours (at 5500-m elevation) over the Eastern Pacific is broad and flat and can extend inland for hundreds of kilometers.

Accompanying the warm temperatures aloft, are warm temperatures on the central valley floor. The coastal cities of San Francisco and Santa Maria have mean daily maximum temperatures in the low- to mid-70s (deg F) while Sacramento averages about 20 F warmer. The northern and southern ends of the Central Valley, represented by Redding and Bakersfield, average an additional 5 F warmer than Sacramento. This heating causes an inland thermal low pressure trough as evidenced by the lower station pressures at Redding and Bakersfield. The pressure gradient enhances the movement of the thermally generated sea breeze through the Carquinez Straight, through other gaps in the coastal range to the north and south of the San Francisco Bay, and sometimes over the coastal range altogether. Pollutants from the San Francisco Bay Area source region are carried with the breeze to receptor regions within the Central Valley. With the abundant sunlight accompanying this weather pattern, the transported pollutants and the Sacramento Valley and San Joaquin Valley emissions cause frequent exceedances of the 1hr and 8hr standards at several sites in the interior of the Central Valley.

This typical scenario is observed on most summer afternoons. For the San Francisco Bay Area, Hayes et al. (1984) assign a frequency of 77% to sea breeze conditions matching average surface wind streamlines at 1600 PST. They give a frequency of 75% for the Sacramento Valley. However, the high pressure system can migrate with changes in the planetary weather pattern. The center of the pressure cell can move ashore, causing a decrease and even a reversal in the mean pressure gradients (Pun et al. 1998). The sea breeze is weakened, and its inland extent can become limited, leading to stagnation conditions fostering higher ozone concentrations in many areas. The high can also move east all together, followed by a trough that ventilates the valley. The high pressure is not always dominant. Neff et al. (1994) classified synoptic patterns during summer 1994 and found approximately one-third of the days to be “normal” Pacific highs, one-third to be inland highs, and one-third to be troughs. Therefore, the mesoscale sea breeze surface pattern, with 77% frequency, must exist in more than one synoptic regime. Mesoscale features must be considered in any discussion of ozone climatology. Several mesoscale flow features in Central California can have significant air quality impacts by transporting or blocking transport of ozone and precursors between important source/receptor couples. These are discussed below.

The Sea Breeze and Marine Air Intrusion

Differential heating between the land and ocean causes a pressure gradient between the relatively cooler denser air over ocean and the warmer air over the land. The marine air mass comes ashore. However, this heating takes time to occur and may be impeded if a cloud cover prevents direct insolation of the land. A further complication may be provided by any additional surface pressure gradients due to synoptic conditions that can enhance, hinder, or overwhelm this thermal effect. The actual time of onset of a sea breeze can be difficult to forecast with overnight fog or coastal status. Typically, with calm coastal mornings, rush hour pollutants can accumulate in the coastal source region. Then, as the sea breeze is established (often by late-morning, usually by mid-day), maximum ozone production can occur after pollutants leave the coastal areas. It is well-known that maximum ozone occurs downwind of respective source areas (e.g., Livermore downwind of the San Francisco Bay communities.) As marine air penetrates the mainland, it is modified and can become entrained in a different thermal flow, e.g., an upvalley or upslope flow. Studies of sea breeze and marine air intrusion impacts on Central California air quality include that by Stoeckenius et al, (1994), who present an objective classification scheme.

Nocturnal Jets and Eddies

A low-level nocturnal wind maximum can arise as the nocturnal inversion forms and effectively reduces boundary layer friction. Wind friction can be represented as a force that is directly opposed to the wind (termed the "antitriptic wind" by Schaefer and Doswell 1980). The overall direction of flow is determined by the vector balance among horizontal pressure gradient, Coriolis, and frictional forces. However, in the evening, with the establishment of a surface-based nocturnal inversion, the friction is "turned off." The flow is no longer in balance, and there is a component of the pressure gradient force that is directed along the wind, increasing wind speed, which increases the Coriolis force. Since Coriolis force is always 90^o to the right of the wind (in the northern hemisphere), this means that the wind must veer. In the San Joaquin Valley, the rapidly moving jet (7-30 m/s) may veer toward the western valley but is channeled by the topography and soon encounters the Tehachapi range. While the nocturnal jet may be present in other seasons, it has been observed during the ozone season (Smith et al. 1981). It is believed to be a transport mechanism during the summer months. Depending on the temperature structure of the valley, the jet may not be able to exit through Tehachapi Pass (~1400 meters), as it can during the neutral stability of daytime convective heating. The air is forced to turn north along the Sierra foothills at the southeastern edge of the San Joaquin Valley. During the Southern San Joaquin Ozone Study, Blumenthal et al. (1985) measured the Fresno eddy extending above 900 meters amsl about 50% of the time. The impact of these jets and eddies is to redistribute pollutants within an air basin. The San Joaquin Valley nocturnal jet can bring pollutants from the north part of the valley to the south overnight. Ozone created in the south San Joaquin Valley can then be redistributed to the central San Joaquin Valley and/or can be transported into layers aloft by the eddy. The Schultz eddy forms when westerly marine air flow in the south San Joaquin Valley (which may become a jet with the evening boundary layer) impacts the Sierra and turns north. It can redistribute pollutants to Sutter Buttes and points north and east (or west after a half-circulation) of Sacramento (Schultz, 1975; ARB, 1989).

Upslope/Downslope Flow

The increased daytime heating in mountain canyons and valleys with a topographic amplification factor (i.e., heating less air volume when compared to flat land; see White, 1991) causes significant upslope flows during the afternoons in the San Joaquin and Sacramento Valleys. This can act as a removal mechanism, and can lift mixing heights on edges of the valleys, relative to the mixing heights at valley center. Myrup et al. (1989) studied transport of aerosols from the San Joaquin valley into Sequoia National Park. They found a net up flow of most species. The return flow can bring pollutants back down. Smith et al. (1981) from tracer mass budgets during tracer releases has estimated pollutant budgets due to slope flow fluxes (and other ventilation mechanisms). Smith et al. caution that less polluted air at higher elevations is entrained in the slope flow, thus diluting San Joaquin Valley air and removing less pollutants. From the tracer mass balance, they found that northwesterly flow was a more effective dilution mechanism, and the benefits of slope flow removal by upslope flows would be confined to the edges of the valley.

Up-Valley/Down-Valley Flow

Up-valley flow draws air south in the San Joaquin Valley and north in the Sacramento Valley during the day, while down-valley drainage winds tend to ventilate both valleys at night.

Conclusion

The spatial pattern of ozone exceedances is associated with the frequency of particular meteorological conditions that affect transport of pollutants from the major urban centers (i.e., San Francisco Bay Area and Sacramento) to the San Joaquin Valley, Sacramento Valley and to the Mountain Counties. This analysis showed the importance of the sea breeze in determining spatial distribution of ozone accumulation. When the sea breeze is inhibited, higher ozone levels occur throughout the region. In addition, it demonstrates that ozone impacts in the Sacramento area are caused by regional meteorological conditions that exist over large length scales. Thus, regional ozone impacts are a direct consequence of the mesoscale meteorological patterns that exist in region, rather than the specific location of sources of NO_x and VOCs. Both the CPP and REP are located in similar atmospheric and surface geological terrains and thus are subjected to similar meteorological conditions.

The CPP UAM modeling domain included these same meteorological parameters that would simulate the mesoscale patterns that are the driving force in producing high ozone days. Since these mesoscale parameters are of sufficient length scales to incorporate the REP and CPP impact areas, the CPP UAM modeling is applicable to the REP project. With the relatively close proximity of REP to CPP and given that the meteorological modeling domain is of sufficient length scale, review of the CPP UAM modeling analysis shows that the same regional meteorological patterns input into UAM would exist over the Placer County Air Basin, thus, making the existing UAM modeling study applicable to REP in terms of magnitude and scope.

With the application of the Placer County APCD 2.0 distance ratio, which also accounts for the spatial separation of sources, to the 2.6:1 VOC/NO_x ratio from CPP, the resulting offset ratio is 5.2:1. Therefore, based on the fact that regional meteorology is the driving force in producing high ozone concentrations and that the same mesoscale meteorological conditions exist at both the CCP and REP sites, REP proposes to use an overall VOC to NO_x ratio of 5.2:1 for currently identified VOC to NOx conversions. This VOC/NO_x ratio would produce the highest offset ratio used for any power plants in the state.

If you have any questions or comments, please do not hesitate to call me at (805) 569-6555.

Sincerely,

ATMOSPHERIC DYNAMICS, INC.

Gregory Darvin

Gregory Darvin

APPENDIX G

LETTERS REGARDING OFFSETS

11464 B Avenue, Auburn, CA 95603 (530) 889-7130 Fax (530) 889-7107
Todd Nishikawa, Acting Air Pollution Control Officer

October 20, 2004

Mr. Charles Schneider **UPS OVERNIGHT**
Enron North America Corp.
1221 Lamar
Houston, Texas, 77010-1221
Phone (713)-853-1789

Subject: Transfer of Emission Reduction Credits

Dear Mr. Schneider:

The District has completed the transfer of Emission Reduction Credit (ERCs) which was requested in your October 12, 2004 letter. ERC Certificate Number 2001-23, 2002-26, 2001-22 have been transferred in full to the City of Roseville. A portion of ERC Certificate Number 2001-24 was transferred to the City of Roseville. The balance was reissued to Enron North America as shown below:

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
From Enron North America ERC Certificate 2001-24	50,676	50,676	50,676	50,676
To City of Roseville ERC Certificate 2004-04	22,680	0	13,440	22,680
Balance to Enron North America ERC Certificate 2004-06	27,996	50,676	37,236	27,996

All certificates are enclosed per your request. An Enron North America representative must sign ERC Certificate 2004-06 and return a copy to the District. The certificates which were transferred to the City of Roseville are to be signed by them upon receipt. Please contact me at (530) 889-7133 if you have any questions.

Sincerely,

John Finnell
Sr. Air Pollution Control Engineer

Encl: ERC Certificates #2004-02, 2004-03, 2004-04, 2004-05 and 2004-06

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11464 B Avenue, Auburn, CA 95603 • (530) 889-7130 • Fax (530) 889-7107
Thomas J. Christofk, Air Pollution Control Officer

EMISSION REDUCTION CREDIT
CERTIFICATE NO. 2004-02
(Reference No. 2001-20 and 2001-22)

IS HEREBY ISSUED TO
City of Roseville
2090 Hilltop Circle
Roseville, CA 95677

FOR ACTUAL EMISSION REDUCTIONS CREATED AT
RC Collett, Inc.
1800 Sunset Blvd.,
Rocklin, CA 95677

EMISSIONS UNITS: Aggregate Plant

THE FOLLOWING EMISSION REDUCTIONS (IN POUNDS PER QUARTER) ARE HEREBY GRANTED PURSUANT TO DISTRICT RULE 504:

POLLUTANT	1st QTR	2nd QTR	3rd QTR	4th QTR
Fine Particulate (PM-10)	2,578	22,263	16,085	15,916

SUBJECT TO THE FOLLOWING CONDITIONS

1. The issuance of this ERC certificate shall not constitute evidence of compliance with the rules and regulations of the District, or a representation or assurance to the recipient upon which reliance is authorized or intended that the ERC represented by the ERC certificate are available from the District ERC bank.

2. Upon transfer of ERC's between parties, the transferor's ERC certificate, and a copy of an agreement, signed by the transferor, authorizing and memorializing the transfer of the ERC to the transferee must be surrendered to the Air Pollution Control Officer by the transferee, within 30 days of the date of the agreement authorizing the transfer of the ERC's.

DATE ISSUED: 11/9/2004

BY: ______________________________
THOMAS J. CHRISTOFK
AIR POLLUTION CONTROL OFFICER

____
SIGNATURE, OWNER'S REPRESENTATIVE

____
PRINTED NAME OF SIGNATORY

____
TITLE

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11464 B Avenue, Auburn, CA 95603 • (530) 889-7130 • Fax (530) 889-7107

Thomas J. Christofk, Air Pollution Control Officer

EMISSION REDUCTION CREDIT

CERTIFICATE NO. 2004-03

(Reference No. 2001-02, 2001-12, 2001-23)

IS HEREBY ISSUED TO
City of Roseville
2090 Hilltop Circle
Roseville, CA 95677

FOR ACTUAL EMISSION REDUCTIONS CREATED AT
Georgia-Pacific Corporation
23801 Foresthill Road
Foresthill, California 95631

EMISSIONS UNIT: SAWMILL WITH TWO WOODWASTE FIRED BOILERS

THE FOLLOWING EMISSION REDUCTIONS (IN POUNDS PER QUARTER) ARE HEREBY GRANTED PURSUANT TO DISTRICT RULE 504:

POLLUTANT	1st QTR	2nd QTR	3rd QTR	4th QTR
NITROGEN OXIDES	5,050	5,050	5,050	5,050

SUBJECT TO THE FOLLOWING CONDITIONS

1. The issuance of this ERC certificate shall not constitute evidence of compliance with the rules and regulations of the District, or a representation or assurance to the recipient upon which reliance is authorized or intended that the ERC represented by the ERC certificate are available from the District ERC bank.

2. Upon transfer of ERC's between parties, the transferor's ERC certificate, and a copy of an agreement, signed by the transferor, authorizing and memorializing the transfer of the ERC to the transferee must be surrendered to the Air Pollution Control Officer by the transferee, within 30 days of the date of the agreement authorizing the transfer of the ERC's.

DATE ISSUED: October 20, 2004

SIGNATURE, OWNER'S REPRESENTATIVE

BY:

THOMAS J. CHRISTOFK
AIR POLLUTION CONTROL OFFICER

PRINTED NAME OF SIGNATORY

TITLE

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11464 B Avenue, Auburn, CA 95603 • (530) 889-7130 • Fax (530) 889-7107

Thomas J. Christofk, Air Pollution Control Officer

EMISSION REDUCTION CREDIT

CERTIFICATE NO. 2004-04

(Reference No. 2001-03, 2001-13, 2001-24)

IS HEREBY ISSUED TO
City of Roseville
2090 Hilltop Circle
Roseville, CA 95677

FOR ACTUAL EMISSION REDUCTIONS CREATED AT
Georgia-Pacific Corporation
23801 Foresthill Road
Foresthill, California 95631

EMISSIONS UNIT: SAWMILL WITH TWO WOODWASTE FIRED BOILERS

THE FOLLOWING EMISSION REDUCTIONS (IN POUNDS PER QUARTER) ARE HEREBY GRANTED PURSUANT TO DISTRICT RULE 504:

POLLUTANT	1st QTR	2nd QTR	3rd QTR	4th QTR
FINE PARTICULAT (PM-10)	22,680	0	13,440	22,680

SUBJECT TO THE FOLLOWING CONDITIONS

1. The issuance of this ERC certificate shall not constitute evidence of compliance with the rules and regulations of the District, or a representation or assurance to the recipient upon which reliance is authorized or intended that the ERC represented by the ERC certificate are available from the District ERC bank.

2. Upon transfer of ERC's between parties, the transferor's ERC certificate, and a copy of an agreement, signed by the transferor, authorizing and memorializing the transfer of the ERC to the transferee must be surrendered to the Air Pollution Control Officer by the transferee, within 30 days of the date of the agreement authorizing the transfer of the ERC's.

DATE ISSUED: October 20, 2004

SIGNATURE, OWNER'S REPRESENTATIVE

BY:

THOMAS J. CHRISTOFK
AIR POLLUTION CONTROL OFFICER

PRINTED NAME OF SIGNATORY

TITLE

11464 B Avenue, Auburn, CA 95603 • (530) 889-7130 • Fax (530) 889-7107
Thomas J. Christofk, Air Pollution Control Officer

EMISSION REDUCTION CREDIT
CERTIFICATE NO. 2004-05
(Reference No. 2001-05, 2001-15, 2001-26)

IS HEREBY ISSUED TO
City of Roseville
2090 Hilltop Circle
Roseville, CA 95677

FOR ACTUAL EMISSION REDUCTIONS CREATED AT
Georgia-Pacific Corporation
23801 Foresthill Road
Foresthill, California 95631

EMISSIONS UNIT: SAWMILL WITH TWO WOODWASTE FIRED BOILERS

THE FOLLOWING EMISSION REDUCTIONS (IN POUNDS PER QUARTER) ARE HEREBY GRANTED PURSUANT TO DISTRICT RULE 504:

POLLUTANT	1st QTR	2nd QTR	3rd QTR	4th QTR
VOLATILE ORGANIC COMPOUNDS	33,512	33,512	33,512	33,512

SUBJECT TO THE FOLLOWING CONDITIONS

1. The issuance of this ERC certificate shall not constitute evidence of compliance with the rules and regulations of the District, or a representation or assurance to the recipient upon which reliance is authorized or intended that the ERC represented by the ERC certificate are available from the District ERC bank.

2. Upon transfer of ERC's between parties, the transferor's ERC certificate, and a copy of an agreement, signed by the transferor, authorizing and memorializing the transfer of the ERC to the transferee must be surrendered to the Air Pollution Control Officer by the transferee, within 30 days of the date of the agreement authorizing the transfer of the ERC's.

DATE ISSUED: October 20, 2004

SIGNATURE, OWNER'S REPRESENTATIVE

BY:

THOMAS J. CHRISTOFK
AIR POLLUTION CONTROL OFFICER

PRINTED NAME OF SIGNATORY

TITLE

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11464 B Avenue, Auburn, CA 95603 • (530) 889-7130 • Fax (530) 889-7107

Thomas J. Christofk, Air Pollution Control Officer

EMISSION REDUCTION CREDIT

CERTIFICATE NO. 2004-06

(Reference No. 2001-03, 2001-13, 2001-24)

IS HEREBY ISSUED TO
Enron North America
P.O. Box 1188
Houston, Texas 77251-1188

FOR ACTUAL EMISSION REDUCTIONS CREATED AT
Georgia-Pacific Corporation
23801 Foresthill Road
Foresthill, California 95631

EMISSIONS UNIT: SAWMILL WITH TWO WOODWASTE FIRED BOILERS

THE FOLLOWING EMISSION REDUCTIONS (IN POUNDS PER QUARTER) ARE HEREBY GRANTED PURSUANT TO DISTRICT RULE 504:

POLLUTANT	1st QTR	2nd QTR	3rd QTR	4th QTR
PM-10	27,996	50,676	37,236	27,996

SUBJECT TO THE FOLLOWING CONDITIONS

1. The issuance of this ERC certificate shall not constitute evidence of compliance with the rules and regulations of the District, or a representation or assurance to the recipient upon which reliance is authorized or intended that the ERC represented by the ERC certificate are available from the District ERC bank.

2. Upon transfer of ERC's between parties, the transferor's ERC certificate, and a copy of an agreement, signed by the transferor, authorizing and memorializing the transfer of the ERC to the transferee must be surrendered to the Air Pollution Control Officer by the transferee, within 30 days of the date of the agreement authorizing the transfer of the ERC's.

DATE ISSUED: October 20, 2004

SIGNATURE, OWNER'S REPRESENTATIVE

BY:

THOMAS J. CHRISTOFK
AIR POLLUTION CONTROL OFFICER

PRINTED NAME OF SIGNATORY

TITLE

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Enron North America Corp.
P.O. Box 1188
Houston, TX 77251-1188

February 25, 2004

Mr. Tom Habashi
Electric Utility Director
City of Roseville
2090 Hilltop Circle
Roseville, California 95747

Re: Purchase and Sale of Emission Reduction Credits

Dear Mr. Habashi:

Pursuant to your request, this letter confirms that Enron North America Corporation ("Enron") and the City of Roseville ("Roseville") recently executed a Purchase and Sale Agreement dated as of February 13, 2004 (the "Agreement") for the purchase and sale of certain emission reduction credits ("ERC's"). As of the date of the Agreement, and subject to the terms and conditions set forth in said Agreement, Enron agrees to sell and Roseville undertakes to buy the following ERC's:

Placer County Air Pollution Control District Certificate #	**Pollutant**	**Quantity (tons/year)**
2001-23	NOx	10.1
2002-26	VOC	67.0
2001-22	PM10	28.4
2001-24	PM10	29.4

Should you have any questions or concerns regarding the above, please do not hesitate to contact Scott Churbock at 713-345-4623.

Sincerely,

Charles E. Schneider RMP
Managing Director

Roseville Electric
Reliable Energy • Dependable Service

2090 Hilltop Circle
Roseville, CA 95747
Office (916) 774-5600
FAX (916) 784-3797
TDD (916) 774-5220
www.RosevilleElectric.org

May 4, 2004

Mr. Tom Christofk
Air Pollution Control Officer
Placer County Air Pollution Control District
11464 B Avenue
Dewitt Center
Auburn, CA 95603

Subject: ***Roseville Energy Park***
Disclosure of Confidential Emission Reductions

Dear Mr. Christofk,

Roseville Electric has been diligently pursuing securing emission reductions for use as offsets for the Roseville Energy Park (REP). We had previously submitted information to Placer County Air Pollution Control District (District) to support your analysis and preparation of the Determination of Compliance (DOC). Some of the information previously submitted identified holders of Emission Reduction Credits (ERCs) and owners of facilities that may create new ERCs with whom Roseville Electric was negotiating. The District agreed to treat this information as confidential pursuant to state and federal law. At this time, Roseville Electric has concluded negotiations with two emission reduction sources. Since these negotiations have concluded, the District would no longer have to treat the information about these two sources as confidential. We are currently negotiating with others to obtain additional emission reductions and therefore request that the District continue to treat any information previously submitted, other than information relating to the two sources outlined in the attachment to this letter as confidential.

Sincerely,

Robert Hren

Robert Hren
REP Project Manager

Attachment to letter, R. Hren to T. Christofk dated 5-4-04

Roseville Energy Park
Additional NOx ERC's

I. Existing ERC's. Roseville Electric and the City of Roseville have concluded negotiations for the following NOx emission reduction credits (ERC's) that are currently held by Calpine Corporation and are banked in the Yolo-Solano Air Quality Management District (YSAQMD):

	(units: pounds per quarter)			
ERC Certificate No.	Q1	Q2	Q3	Q4
EC-209	0	6,888	0	3,542
EC-210	0	10,620	0	4,414

Roseville Electric will be requesting that the interdistrict transfer of these ERC's, for application to the Roseville Energy Park in Placer County, be placed on the District Board agenda for YSAQMD on June 9, 2004 and for PCAPCD on June 10, 2004.

II. New ERC's. The City of Roseville has entered into agreements with Energy 2001, Inc. which include an option to purchase at least 10 tons of new NOx ERC's that may be created at the existing Lincoln Landfill, located within Placer County. Energy 2001, Inc. is currently constructing a power generation facility at the landfill, replacing existing power generators. After the replacement generators are in service, additional control equipment could be installed to reduce NOx emissions and result in certification of new NOx ERC's. It is anticipated that the new NOx ERC's will be certified before the Roseville Energy Park enters commercial operation.

11464 B Avenue, Auburn, CA 95603 • (530) 889-7130 • Fax (530) 889-7107
Thomas J. Christofk, Air Pollution Control Officer
www.placer.ca.gov/apcd

May 6, 2004

Mr. Robert Hren, REP Project Manager
Roseville Electric
2090 Hilltop Circle
Roseville, CA95747

Subject: Emission Reduction Credits

Dear Mr. Hren:

The District has received your letter regarding the disclosure of confidential emission reductions for the Roseville Energy Park project. The two emission reduction credit (ERC) certificates, EC-209 and EC-210, issued by Yolo-Solano AQMD (YSAQMD), identified will no longer be treated as confidential and will be identified in the Preliminary Determination of Compliance (PDOC) after staff have reviewed YSAQMD's background documentation on these ERCs.

The attachment to your letter, Item II., New ERCs, discussed potential ERCs from the landfill gas power generators which are being constructed by Energy 2001. This source operated an engine for a very limited time and shut the engine down more than a year ago. Energy 2001 has been issued an Authority to Construct to install two engines. We have not received a notification of completion of construction and presume the engines have not been installed or operated.

District Rule 504, Emission Reduction Credits, identifies the process for quantifying and certifying emission reductions for use of offsets. As stated in the Rule 504, Section 301, only actual emission reductions shall be certified as ERCs. At this time, there are no documented actual emissions reductions at Energy 2001 which could be certified ERCs under Rule 504. The District does not consider emission reductions which might be certified at some future date a viable source of offsets for the Roseville Energy Park.

We do recognize that Roseville Electric is continuing efforts to secure additional ERCs for offsets. Those credits which have been obtained will be discussed in the PDOC. The PDOC will indicate that that there may be shortfall of offsets and the identification of additional ERC certificates for offsets are required before we can prepare a final Determination of Compliance. This must include the ERC certificate number, quantities for each quarter, location of the source of ERCs, and distance of source of ERCs from the Roseville Energy Park.

You might consider other options including reducing the design capacity and resulting emissions from the project or reducing the hours of operation and resulting emissions to the extent that offsets are available at this time.

As you are aware, any ERCs which are to be transferred from outside the District do need to be approved by both District Boards pursuant to the California Health and Safety Code Section 40709.6, Offset by Reductions Credited to Stationary Source Located in Another District. This approval must be obtained prior to the District's issuance of a final Determination of Compliance.

We have scheduled an agenda item this matter for the June 10, 2004 District Board meeting. All available ERCs which are to be transferred should be identified along with a justification for approval under Section 40709.6. This information is needed by no later than May 21, 2004 so that we may prepare the Board package. If not available at that time, the next Board meeting is scheduled for August. Please be aware that failure to obtain approval or delaying approval of interdistrict transfer of ERCs will delay or prevent the issuance of the final Determination of Compliance.

Please contact me at (530) 889-7133 if you have any questions.

Sincerely,

John Finnell
Sr. Air Pollution Control Engineer

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